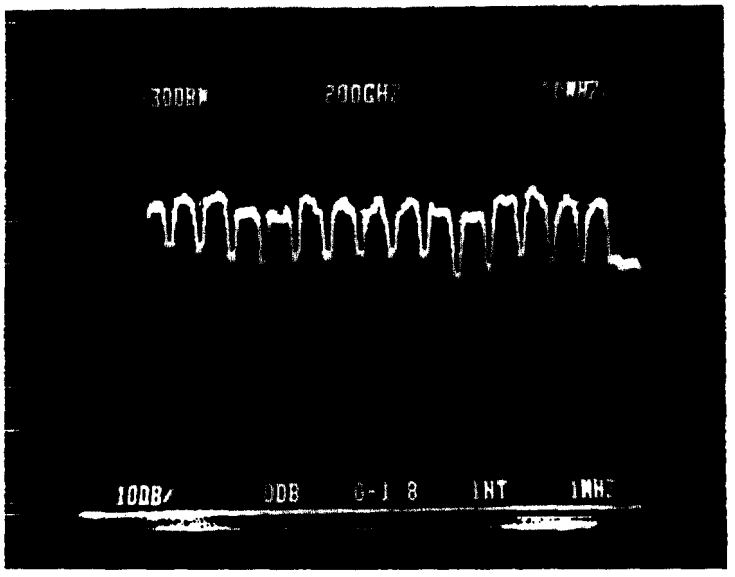
King Ranch, Texas

Reference Level dBm_1

Azimuth: 205°

Diversified Communications Engineering

-122



Site #8 ECHOSTAR
Date: October 9, 1997
Time of Day: 1030
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 5 dBm

No interference to satellite reception

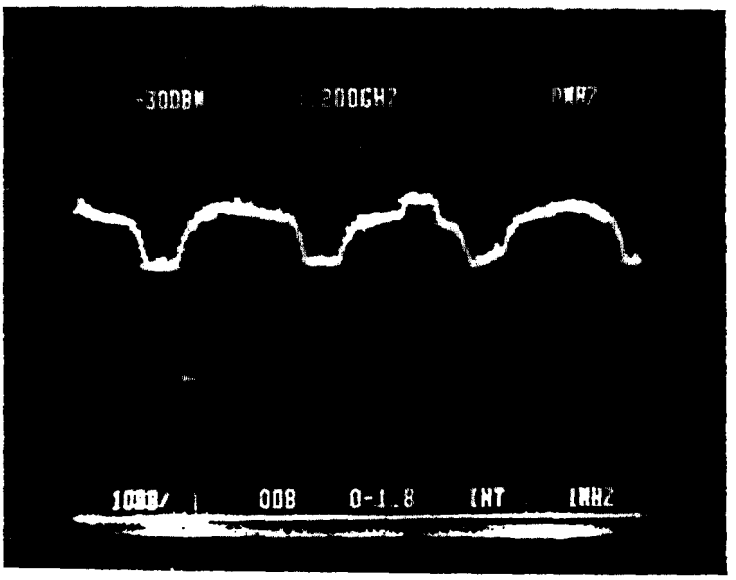
Light cloud cover w/ no rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #8 ECHOSTAR
Date: October 9, 1997
Time of Day: 1036
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 7 dBm

Interference to satellite reception

Light cloud cover w/ no rain

(B)

Figure 3.1-13 RF Spectrum Analysis

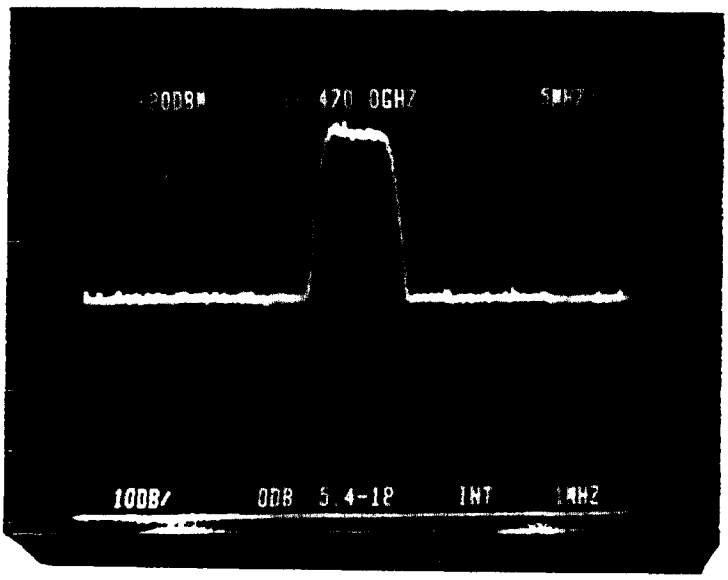
King Ranch, Texas

Azimuth: 70°

Reference Level dBm_i

Diversified Communications Engineering

-95



Site #9
Date: October 10, 1997
Time of Day: 1300
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 9 dBm
Level: -96 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-14 RF Spectrum Analysis

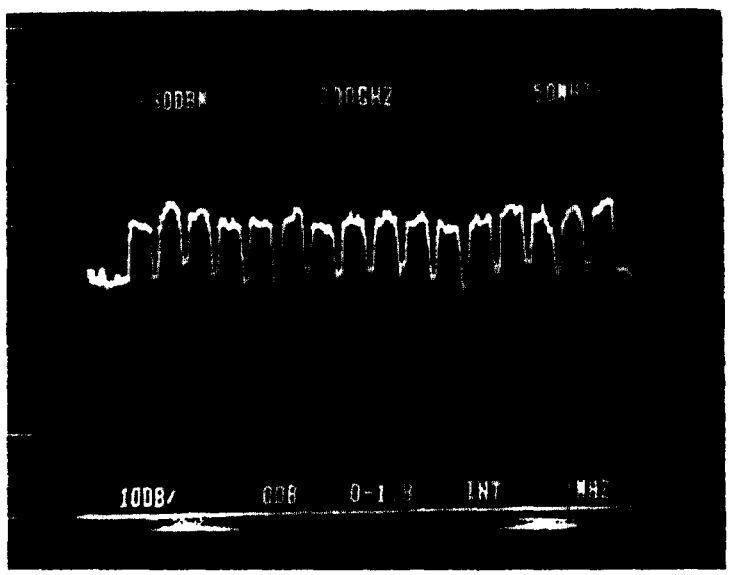
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-122



Site #9 DIRECTV
Date: October 10, 1997
Time of Day: 1338
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 9 dBm

No interference to satellite reception

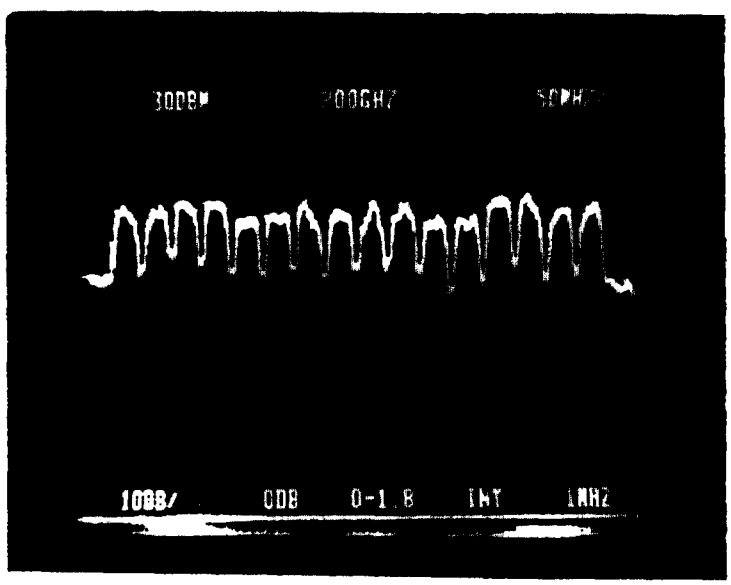
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #9 ECHOSTAR
Date: October 10, 1997
Time of Day: 1345
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 9 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-15 RF Spectrum Analysis

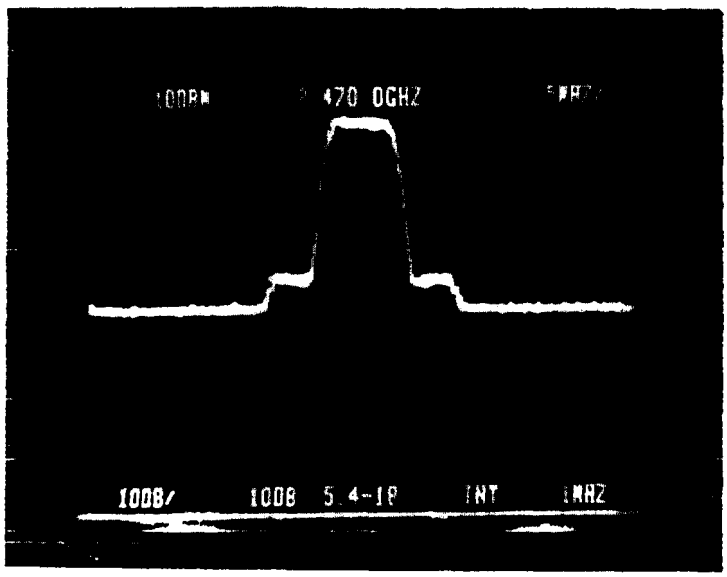
King Ranch, Texas

Reference Level dBm_i

Azimuth: 132°

Diversified Communications Engineering

-85



Site #10
Date: October 10, 1997
Time of Day: 1300
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -85 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-16 RF Spectrum Analysis

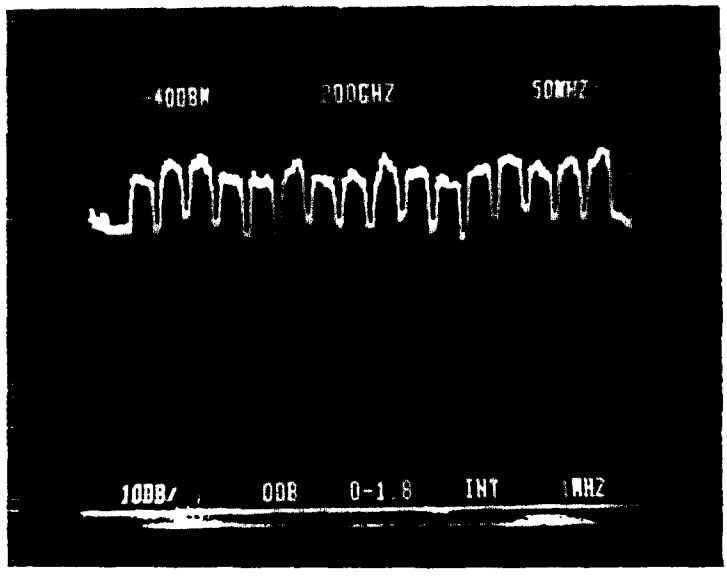
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132



Site #10 DIRECTV
Date: October 10, 1997
Time of Day: 1310
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

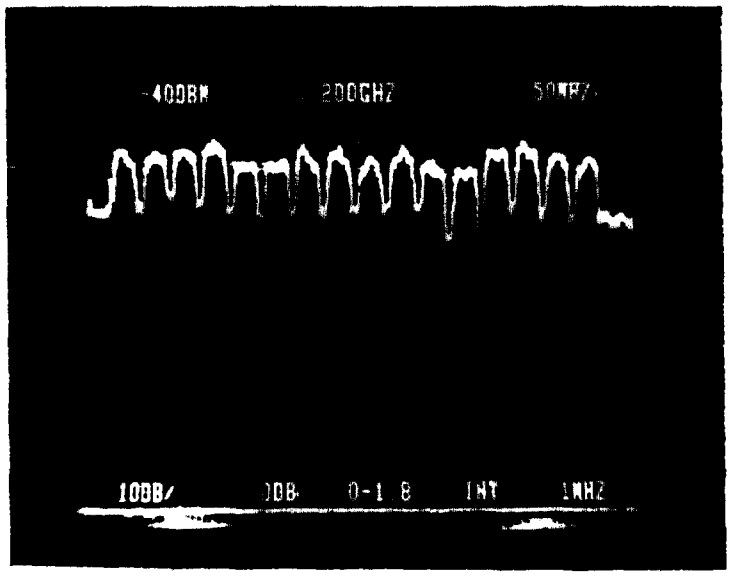
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #10 ECHOSTAR
Date: October 10, 1997
Time of Day: 1315
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-17 RF Spectrum Analysis

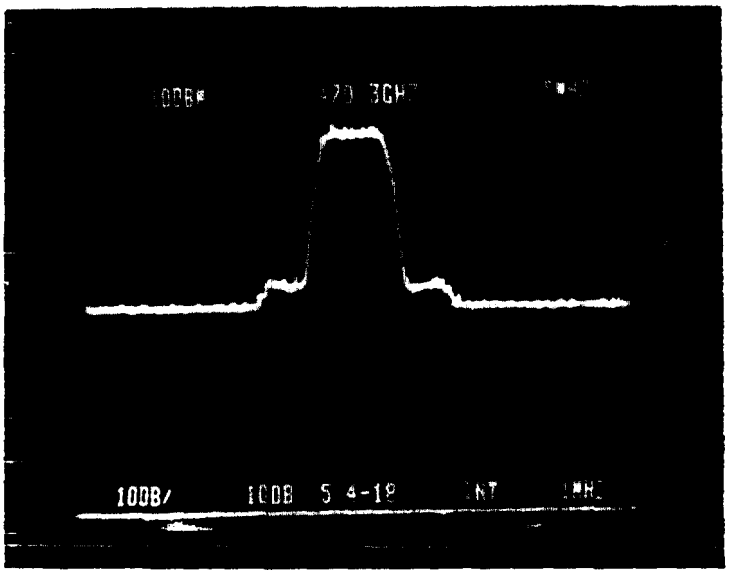
King Ranch, Texas

Reference Level dBm_i

Azimuth: 164°

Diversified Communications Engineering

-85



Site #11
Date: October 10, 1997
Time of Day: 1230
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -87 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-18 RF Spectrum Analysis

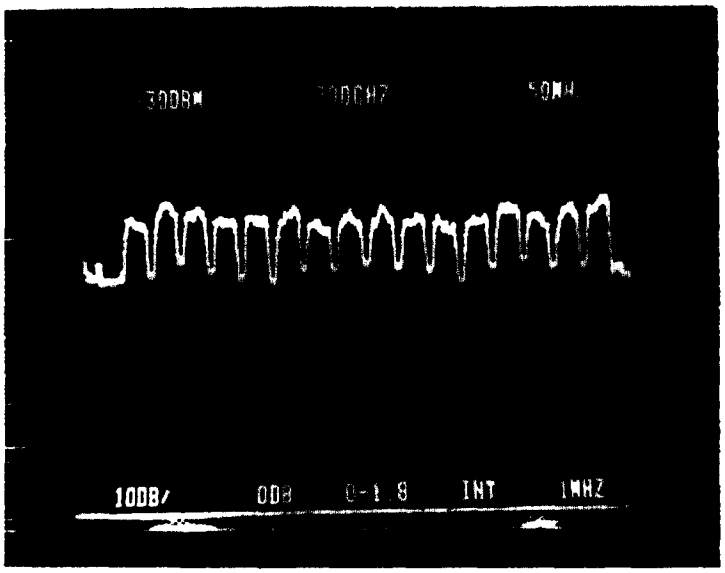
King Ranch, Texas

Azimuth: 186°

Reference Level dBm_t

Diversified Communications Engineering

-122



Site #11 DIRECTV
Date: October 10, 1997
Time of Day: 1234
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

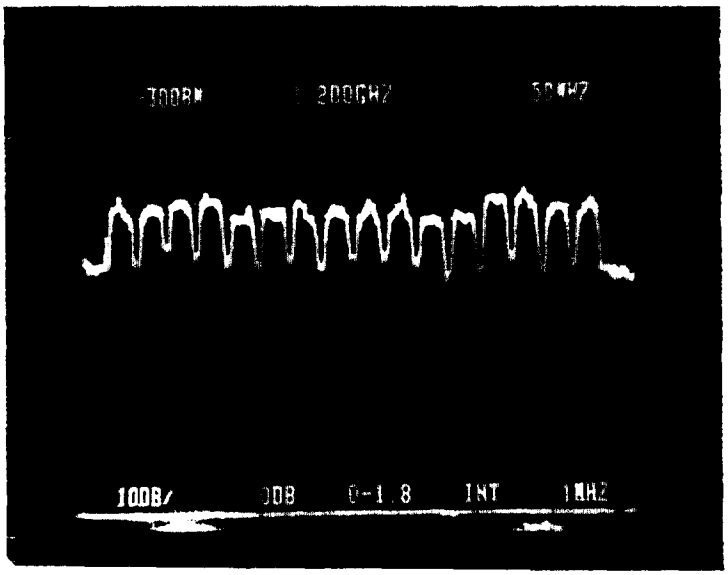
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_t

Azimuth: 205°

-122



Site #11 ECHOSTAR
Date: October 10, 1997
Time of Day: 1238
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-19 RF Spectrum Analysis

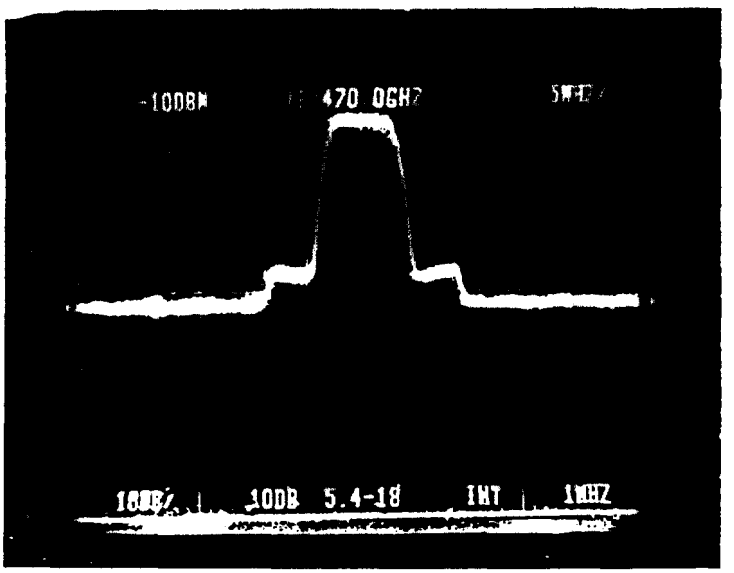
King Ranch, Texas

Reference Level dBm_i

Azimuth: 180°

Diversified Communications Engineering

-85



(A)

Site #12
Date: October 10, 1997
Time of Day: 1100
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -84 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

Figure 3.1-20 RF Spectrum Analysis

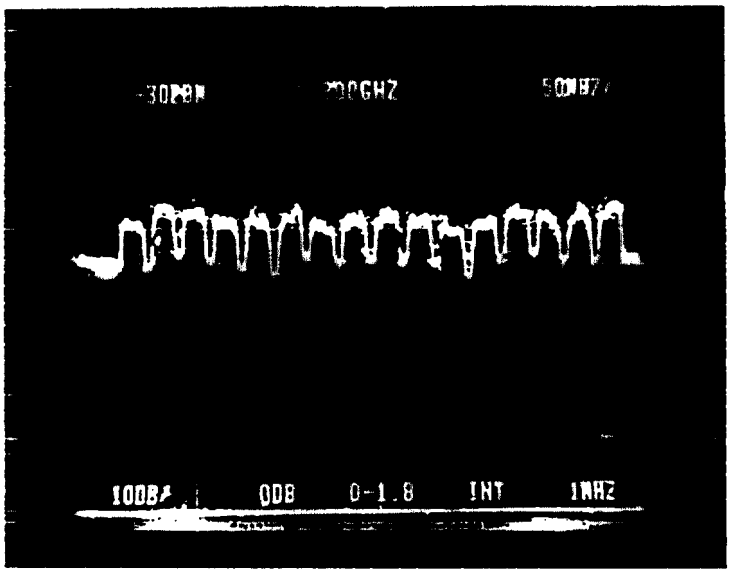
King Ranch, Texas

Reference Level dBm_I

Azimuth: 186°

Diversified Communications Engineering

-122



Site #12 DIRECTV
Date: October 10, 1997
Time of Day: 1112
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

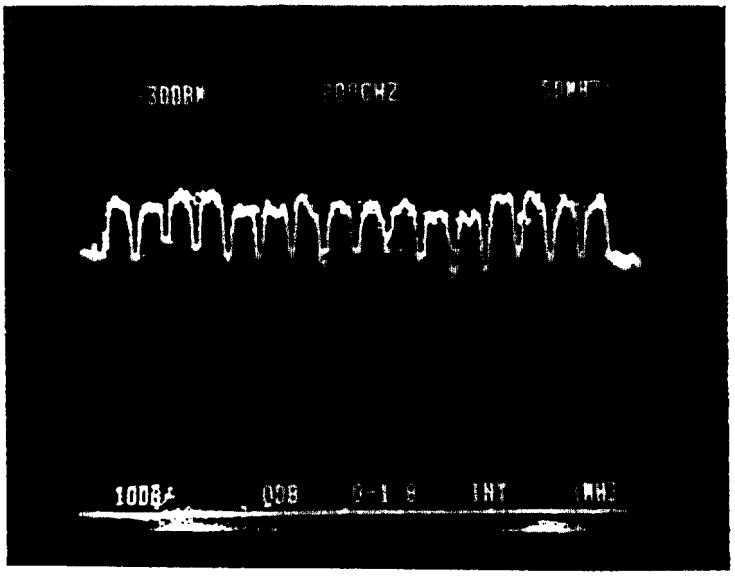
Heavy cloud cover w/ moderate rain

(A)

Reference Level dBm_I

Azimuth: 205°

-122



Site #12 ECHOSTAR
Date: October 10, 1997
Time of Day: 1110
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ moderate rain

(B)

Figure 3.1-21 RF Spectrum Analysis

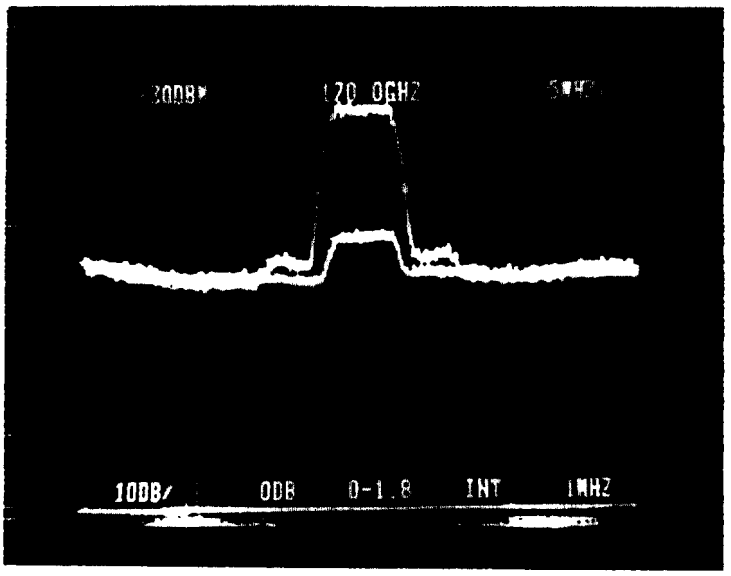
King Ranch, Texas

Reference Level dBm_i

Azimuth: 36°

Diversified Communications Engineering

-122



Site #13
Date: October 10, 1997
Time of Day: 1900
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm

Upper Trace
Level: -121 dBmi*
* Corrected for digital

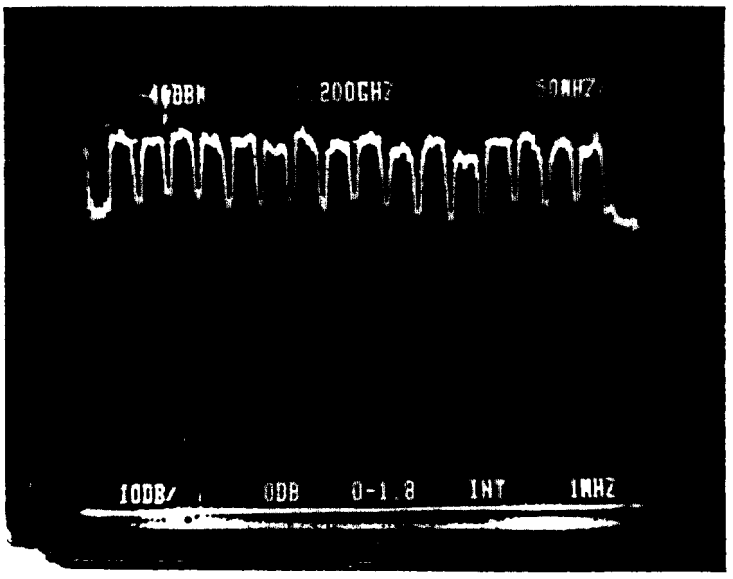
Lower Trace
Level: -144 dBmi*
*Corrected for digital
XMTR Level: 6 dBm
Video rcv excellent

(A)

Reference Level dBm_i

Azimuth: 186°

-132



Site #13
Date: October 10, 1997
Time of Day: 1915
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

DIRECTV

No interference

XMTR Level: 29 dBm

(B)

Figure 3.1-22 RF Spectrum Analysis

3.2 DBS Antenna Test #1 (Azimuth)

TRANSMITTER AT 52' AGL (GROUND ELEV: 85' AMSL)
XMTR OUTPUT POWER: 29 dBm WAVEGUIDE LOSSES: 2 dB
XMIT ANT GAIN: 10 dBi
DBS ANTENNA AT 9' AGL (GROUND ELEV: 80' AMSL)
DISTANCE BETWEEN ANTENNAS = 5280'
DBS ANTENNA AT 32 DEGREES ELEVATION
RECEIVE LEVEL AT DBS ANTENNA SITE = -89 dBmi (corrected for bandwidth)
AZIMUTH FROM TRANSMITTER TO DBS RECEIVER = 180 DEGREES

DBS antenna rotated through 360 degrees in 15 degree increments.

DBS Antenna Pointing Azimuth	Receive Level at DBS Antenna (dBmi)
0	-143
15	-146
30	-148
45	-144
60	-145
75	-149
90	-145
105	-147
120	-147
135	-135
150	-139
165	-140
180	-145
195	-141
210	-136
225	-131
240	-141
255	-144
270	-146
285	-146
300	-141
315	-141
330	-141
345	-146

The results are plotted in Figure 3.2-1 and the measurement data is presented in Figures 3.2-2 through 3.2-13.

	Azimuth	AMSL	Ant. Centerline
Transmitter Antenna	180 Degrees	85 feet	52 feet
DBS Antenna		80 feet	9 feet

Distance between antennas 5280 feet
Transmitter Level at DBS antenna = -89 dBmi

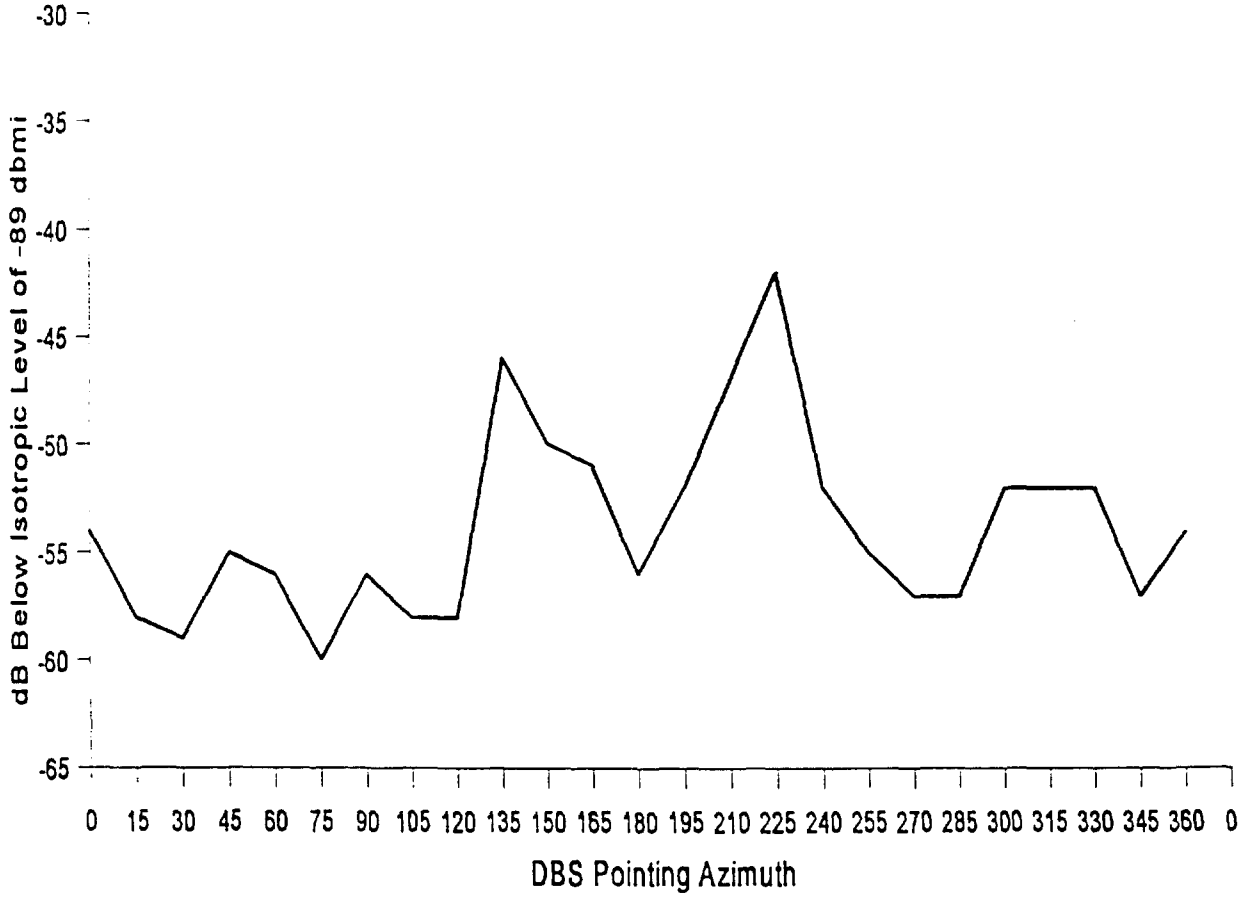


Figure 3.2-1

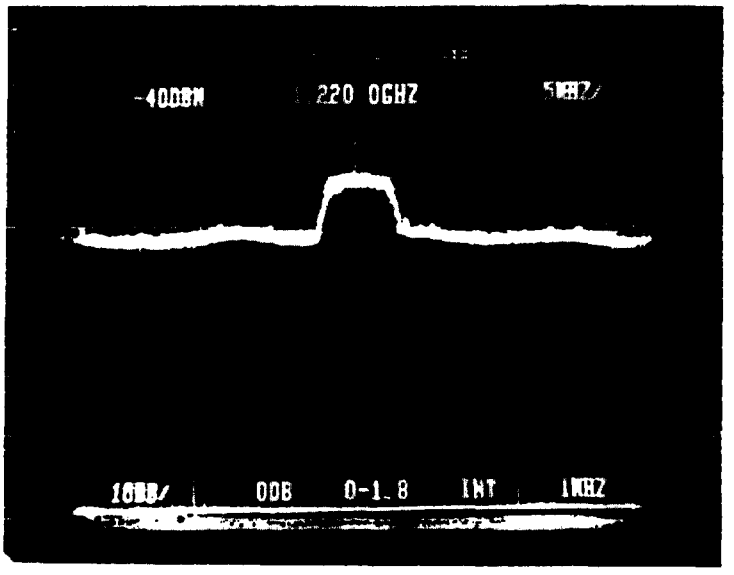
King Ranch, Texas

Reference Level dBm_i

Azimuth: 0°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

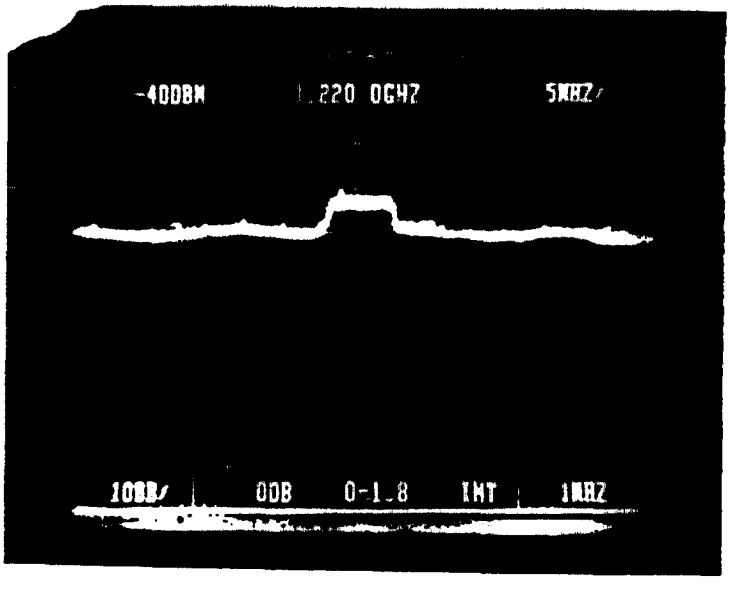
Level: -143 dBmi

(A)

Reference Level dBm_i

Azimuth: 15°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBmi

(B)

Figure 3.2-2 RF Spectrum Analysis

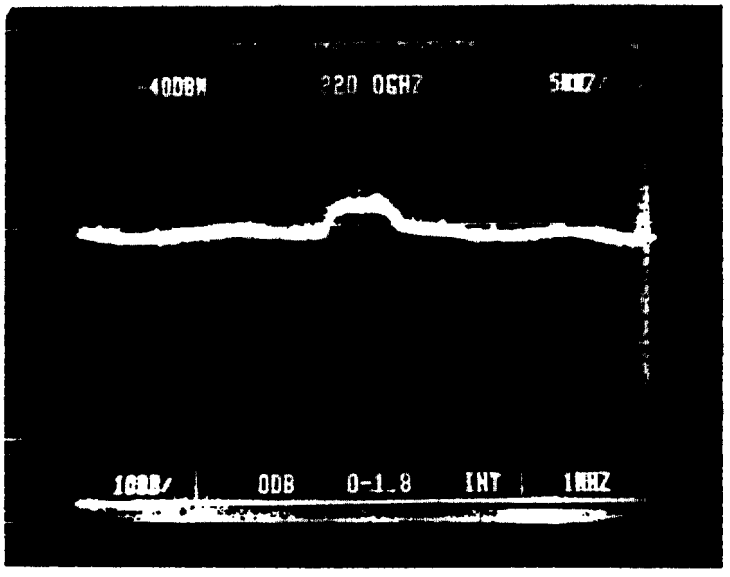
King Ranch, Texas

Azimuth: 30°

Reference Level dBm_I

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

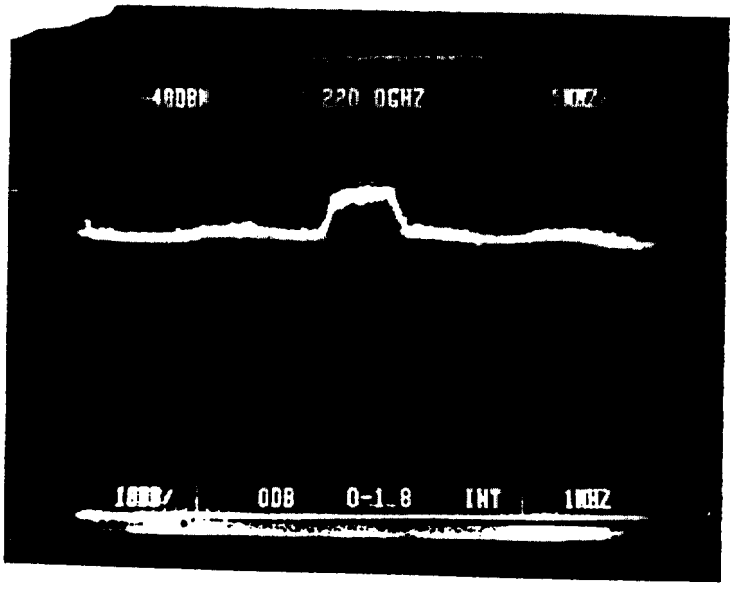
Level: -148 dBmi

(A)

Reference Level dBm_I

Azimuth: 45°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -144 dBmi

(B)

Figure 3.2-3 RF Spectrum Analysis

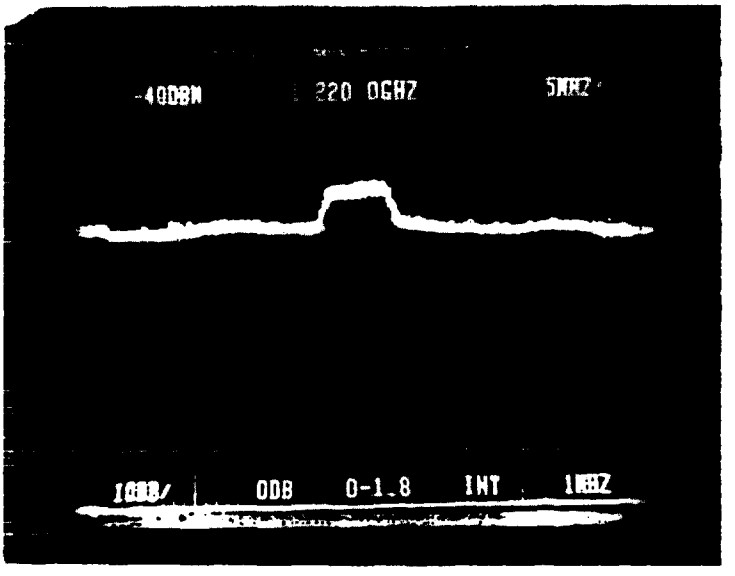
King Ranch, Texas

Reference Level dBm_i

Azimuth: 60°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

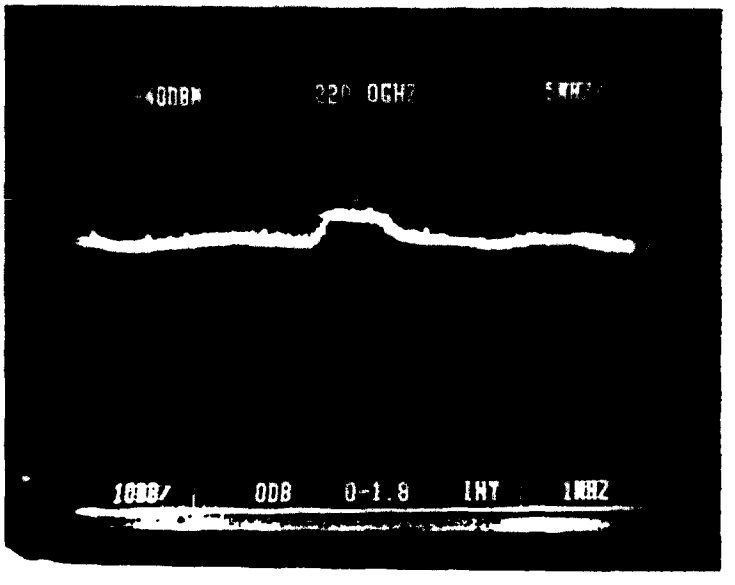
Level: -145 dBmi

(A)

Reference Level dBm_i

Azimuth: 75°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -149 dBmi

(B)

Figure 3.2-4 RF Spectrum Analysis

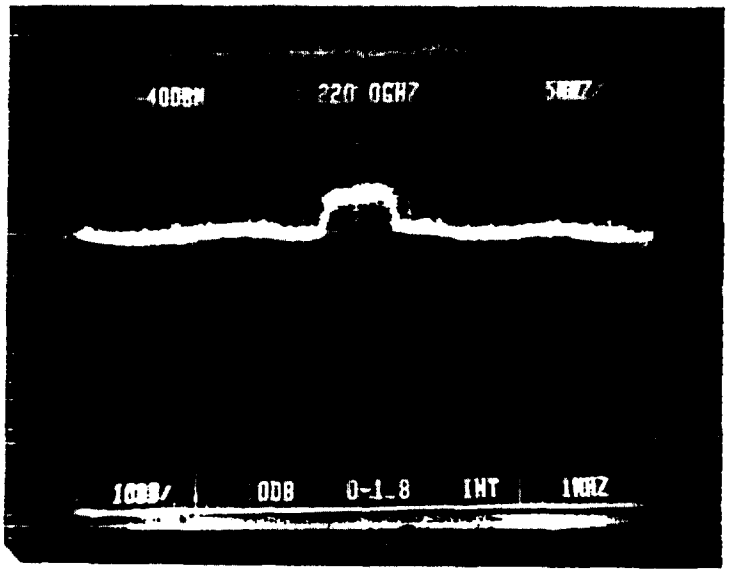
King Ranch, Texas

Azimuth: 90°

Reference
Level
dBm_i

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

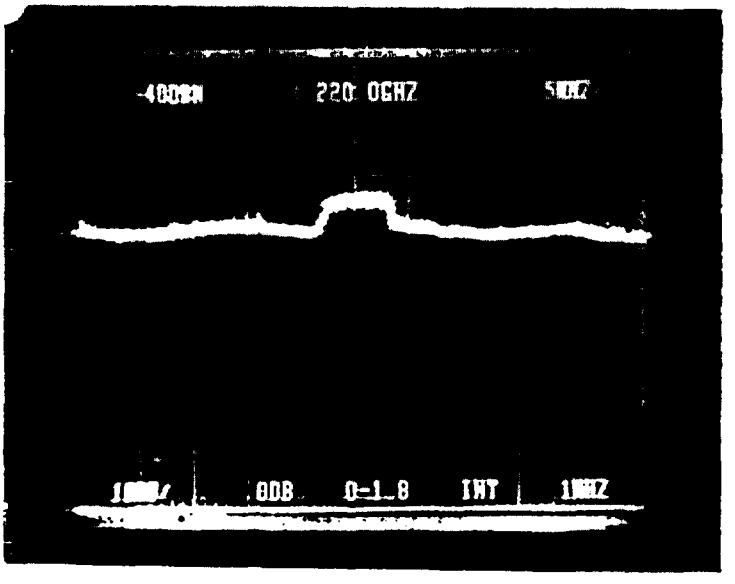
Level: -145 dBmi

(A)

Reference
Level
dBm_i

Azimuth: 105°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -147 dBmi

(B)

Figure 3.2-5 RF Spectrum Analysis

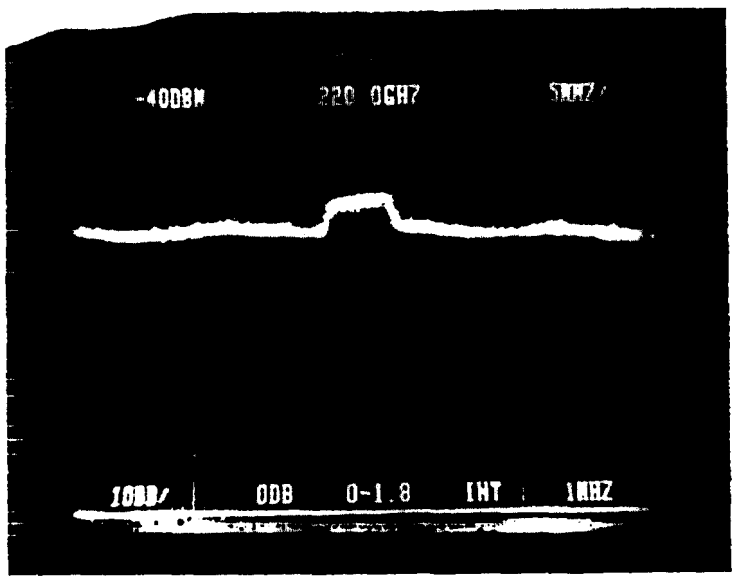
King Ranch, Texas

Azimuth: 120°

Reference
Level
dBm_i

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

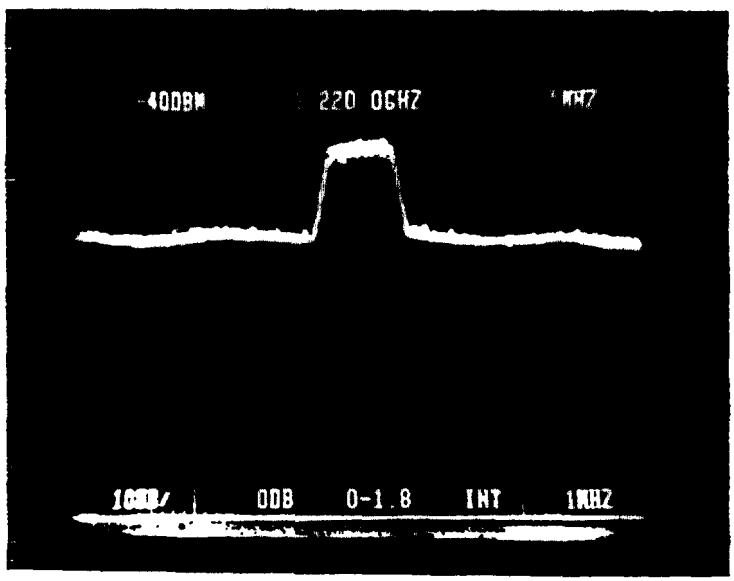
Level: -147 dBmi

(A)

Reference
Level
dBm_i

Azimuth: 135°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -135 dBmi

(B)

Figure 3.2-6 RF Spectrum Analysis

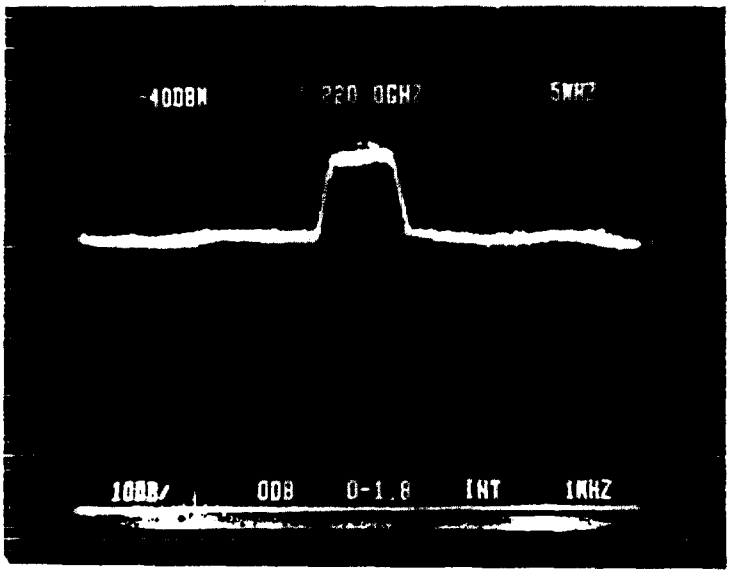
King Ranch, Texas

Reference Level dBm_i

Azimuth: 150°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

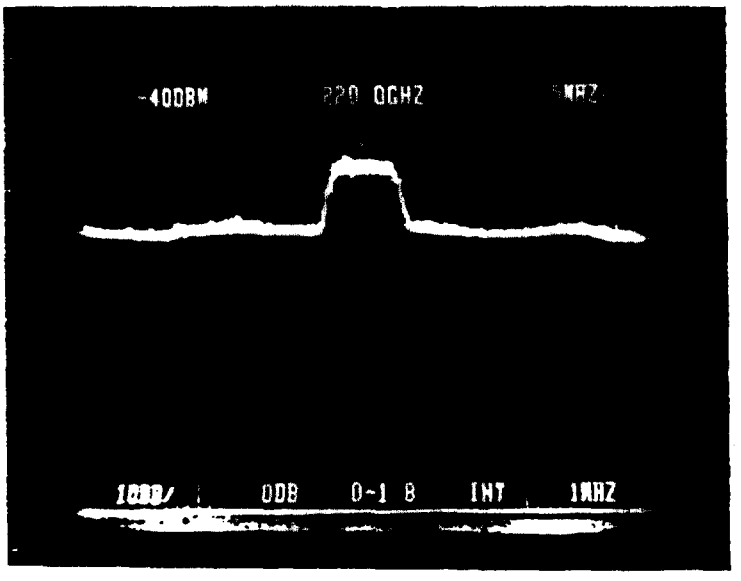
Level: -138 dBmi

(A)

Reference Level dBm_i

Azimuth: 165°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -140 dBmi

(B)

Figure 3.2-7 RF Spectrum Analysis

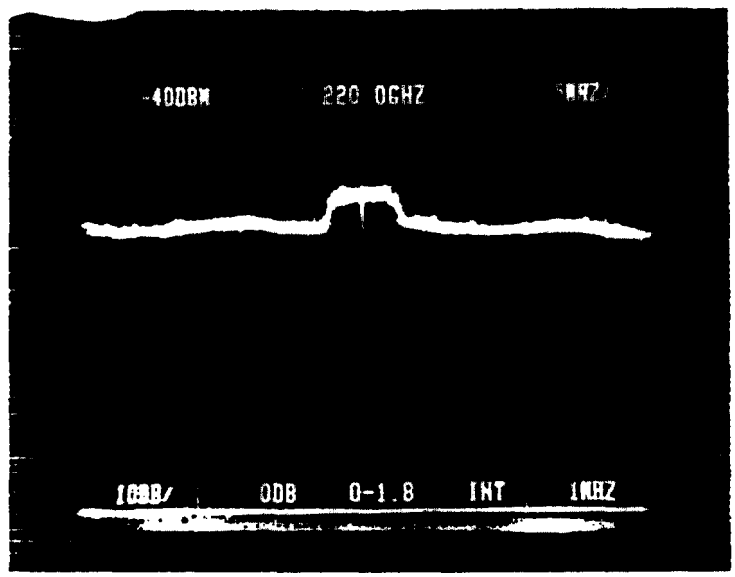
King Ranch, Texas

Reference Level dBm_i

Azimuth: 180°

Diversified Communications Engineering

-123



Antenna Centerline 9 Ft.

Elevation: 32 degrees

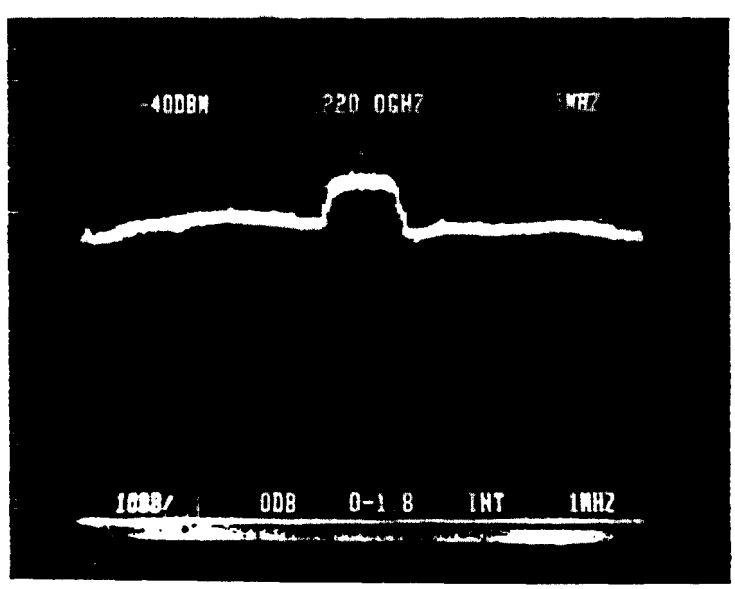
Level: -145 dBmi

(A)

Reference Level dBm_i

Azimuth: 195°

-123



Antenna Centerline 9 Ft.

Elevation: 32 degrees

Level: -141 dBmi

(B)

Figure 3.2-8 RF Spectrum Analysis

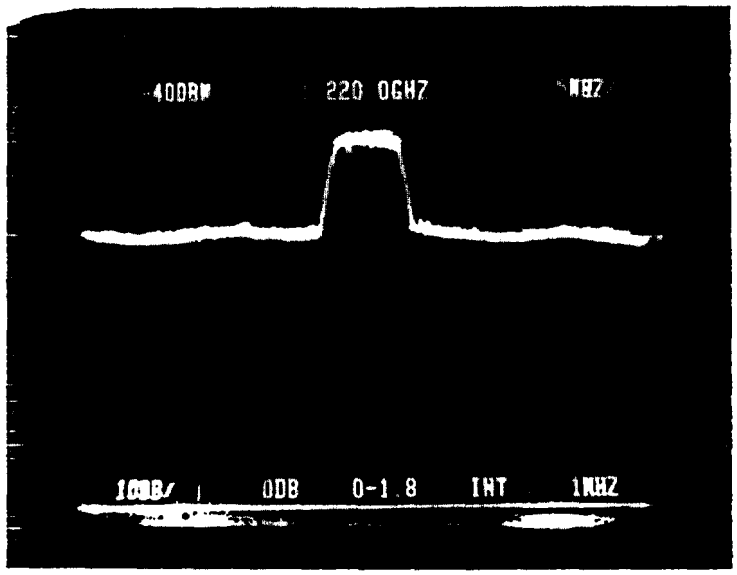
King Ranch, Texas

Reference Level dBm_i

Azimuth: 210°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft

Elevation: 32 degrees

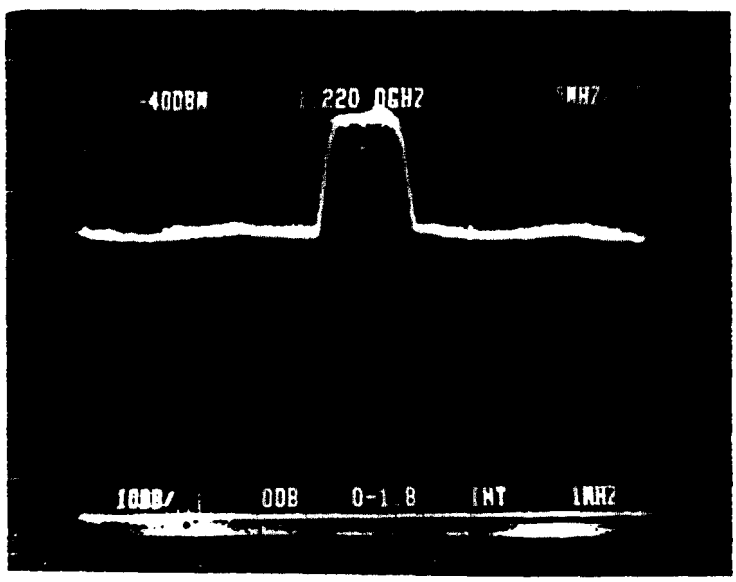
Level: -136 dBmi

(A)

Reference Level dBm_i

Azimuth: 225°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -131 dBmi

(B)

Figure 3.2-9 RF Spectrum Analysis

King Ranch, Texas

Azimuth: 240°

Reference Level dBm_i

Diversified Communications Engineering

-123

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

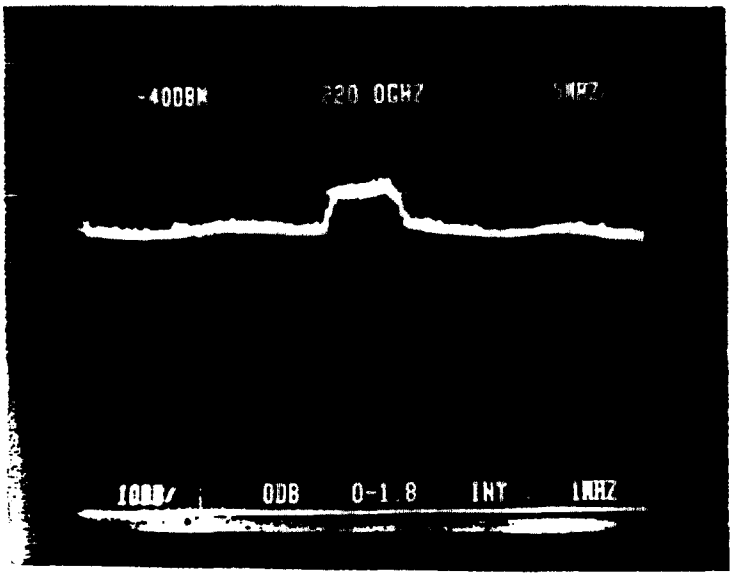
Level: -141 dBmi

(A)

Reference Level dBm_i

Azimuth: 255°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -144 dBmi

(B)

Figure 3.2-10 RF Spectrum Analysis

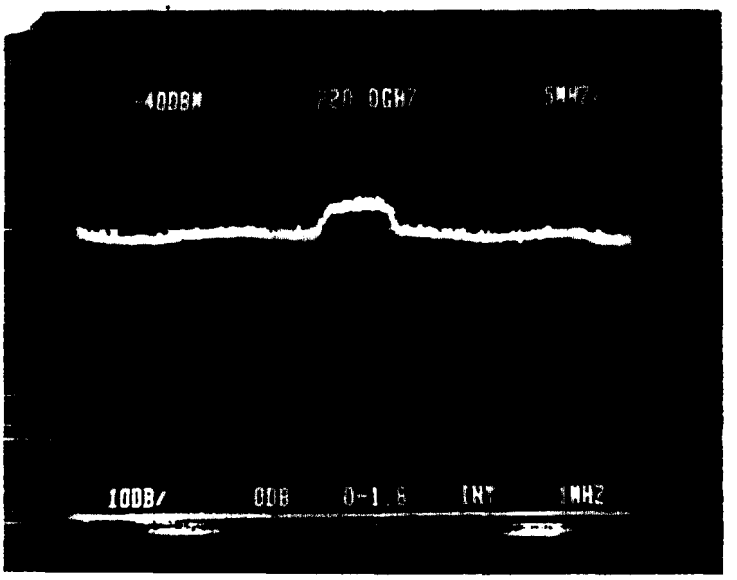
King Ranch, Texas

Reference Level dBm_i

Azimuth: 270°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

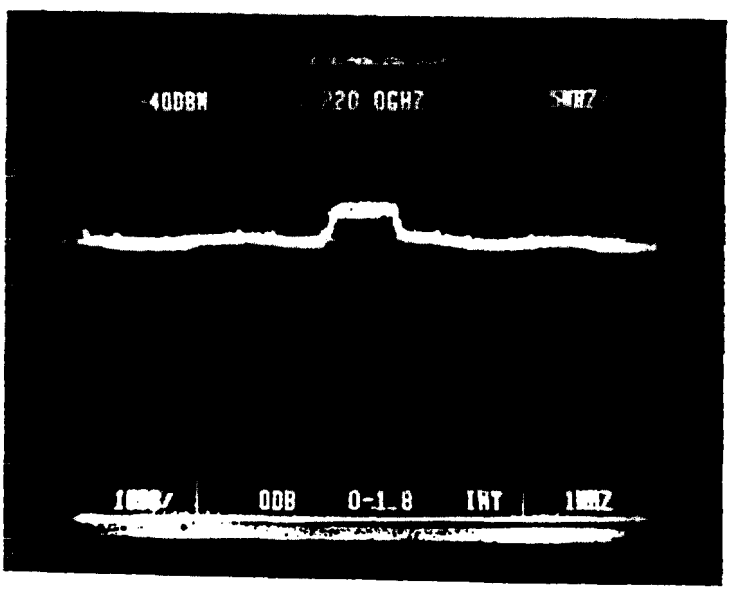
Level: -146 dBmi

(A)

Reference Level dBm_i

Azimuth: 285°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBmi

(B)

Figure 3.2-11 RF Spectrum Analysis

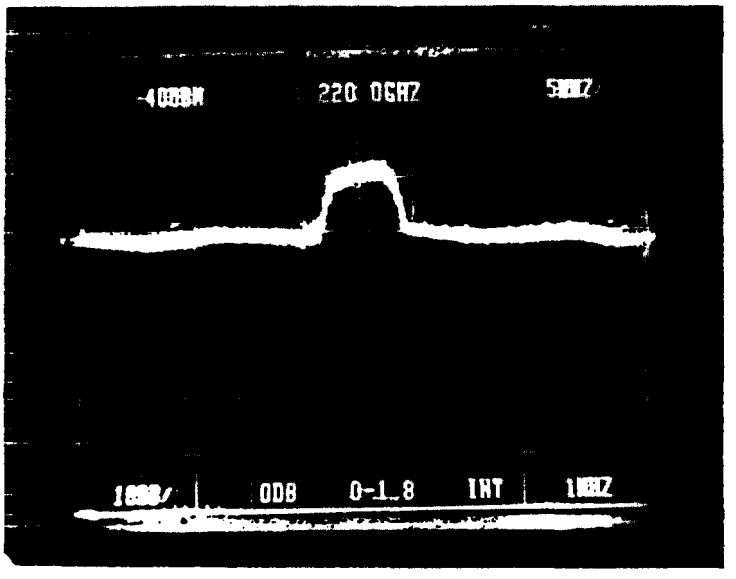
King Ranch, Texas

Reference Level dBm_I

Azimuth: 300°

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -141 dBmi

(A)

Reference Level dBm_I

Azimuth: 315°

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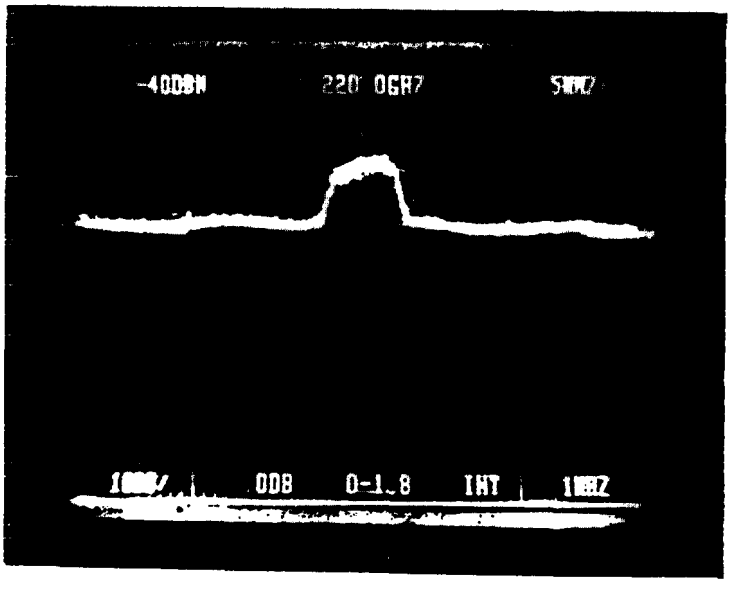

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -141 dBmi

(B)

Figure 3.2-12 RF Spectrum Analysis

King Ranch, Texas

Reference Level dBm_i

Azimuth: 330°

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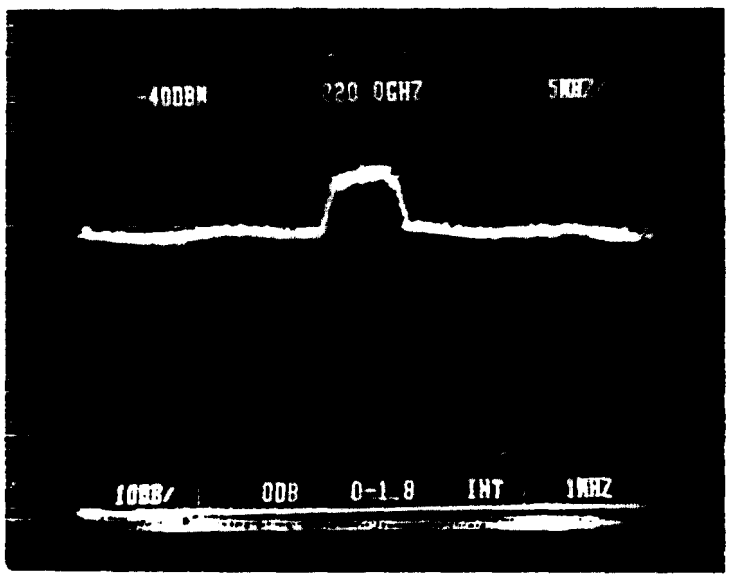


Antenna Centerline: 9 Ft.

Elevation: 32 degrees

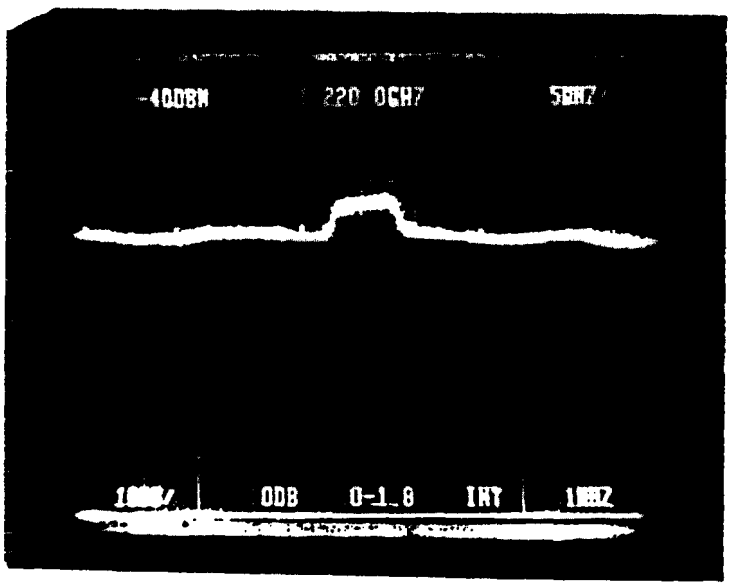
Level: -141 dBmi

(A)

Reference Level dBm_i

Azimuth: 345°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBmi

(B)

Figure 3.2-13 RF Spectrum Analysis

3.3 DBS Antenna Test #2 (Elevation)

TRANSMITTER AT 52' AGL (GROUND ELEV: 85' AMSL)
XMTR OUTPUT POWER: 29 dBm WAVEGUIDE LOSSES: 2 dB
XMIT ANT GAIN: 10 dBi
DBS ANTENNA AT 9' AGL (GROUND ELEV: 80' AMSL)
DISTANCE BETWEEN ANTENNAS = 1320"
DBS ANTENNA AT 180 DEGREES AZIMUTH (AWAY FROM TRANSMITTER)
RECEIVE LEVEL AT DBS ANTENNA SITE = -68 dBmi (corrected for bandwidth)
AZIMUTH FROM TRANSMITTER TO DBS RECEIVER = 180 DEGREES

DBS antenna rotated through 45 degrees of elevation in 5 degree increments.

DBS Antenna Elevation Angle	Receive Level at DBS Antenna (dBmi)
30	-123
35	-124
40	-125
45	-121
50	-120
55	-110
60	-108
65	-124
70	-116
75	-120

Figure 3 3-1 presents a plot of signal level and elevation. The measurement data is presented in Figures 3 3-2 through 3.3-6.